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Patients presenting with lung cancer in South East Scotland

EDINBURGH LUNG CANCER GROUP*
Report prepared by Simon Capewell

ABSTRACT Information was recorded prospectively on 2586 unselected patients with lung cancer seen in hospital during 1981–4. Twenty eight per cent were female and 97% were current smokers or ex-smokers. Two thirds were aged under 70 at the time of diagnosis. The cell type was known in 2117 patients (82%). In the 579 women there was a larger proportion with small cell carcinoma (29% *v* 21%) and adenocarcinoma (18% *v* 11%) but a smaller proportion with squamous cell carcinoma (38% *v* 52%; $p < 0{\cdot}01$) than among the men. The women were also significantly younger. Small cell carcinoma was also more common and squamous cell carcinoma less common in patients aged less than 60 years ($p < 0{\cdot}01$). Only 47 (7%) of the 651 patients diagnosed in 1981 were alive at five years; 35 of the 116 highly selected patients who underwent surgical treatment survived (30%), compared with 17% (7/42) of patients given radical radiotherapy and 1% (5/493) in the patients given palliative radiotherapy, chemotherapy, or symptomatic treatment only. The current outlook for patients with lung cancer remains very poor and the major emphasis must clearly be on prevention.

Introduction

Lung cancer presents a large and growing problem in the United Kingdom, with over 40 000 deaths each year.[1 2] Scotland has probably the highest incidence in the world, over 120 per 100 000 in men and 48 per 100 000 in women.[2 3]

The Edinburgh Lung Cancer Group was formed in 1980 and comprises 11 chest physicians, two oncologists, two pathologists, a thoracic surgeon, a radiotherapist, and a radiologist.[4] Members of the group work in Edinburgh, East and West Lothian, the Scottish Borders, and South and East Fife and together serve a catchment population of about 950 000.[5] They see more than 80% of all new patients with lung cancer presenting within this catchment area.[5] The group aimed to establish a database for lung cancer in South East Scotland to assess the current position, to plan for the future, and to facilitate clinical research. We here describe the patients registered prospectively by the group during the years 1981–4 and review their management and outcome.

Methods

All patients with newly diagnosed lung cancer seen by members of the group from January 1981 to December 1984 were registered. Details including age, sex, occupation, date of first symptoms and of diagnosis, smoking history, body weight, performance status according to the Karnofsky index,[6] and the findings of investigations were entered prospectively on a standardised registration form. Disease staging according to the TNM system[7] was based initially on clinical and radiological features and supplemented by laboratory investigations; more than 80% of patients underwent bronchoscopy. The diagnosis of lung cancer was based on positive histological or cytological appearances or, in the absence of a pathological specimen, on clear clinical and radiographic appearances. Most pathological reports were provided by the group's two pathologists or their close clinical colleagues, agreed criteria for the diagnosis of lung cancer being based on a revised and updated version of the World Health Organisation classification.[8] The initial form of treatment chosen for each patient was also noted: surgery, palliative radiotherapy

*The members of the Edinburgh Lung Cancer Group are: EW Cameron, S Capewell, J Choo-Kang, G K Crompton, AC Douglas, NJ Douglas, Professor DC Flenley (Chairman), J Gaddie, AP Greening, D Lamb, AG Leitch, RCF Leonard, L Matheson, WG Middleton, MA McIntyre, GJR McHardy, GA Newaishy, GR Petrie, Professor JF Smyth, MF Sudlow (Secretary), AJA Wightman.

Address for reprint requests: Dr S Capewell, Department of Medicine, Royal Infirmary, Edinburgh EH3 9YW.

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(1800–2200 cGy (rad)), radical radiotherapy (4250–5740 cGy), chemotherapy, or symptomatic treatment only.

Survival data were obtained from follow up of patients' records supplemented by information from the Cancer Registry for South East Scotland.[9] Group differences were tested using the χ^2 method and actuarial survival in different subgroups was compared by the life table method of Lee and Desu offered by the SPSSx Program.[10]

Results

In the four complete years from 1 January 1981 to 31 December 1984 2586 patients were registered by members of the group. Of these, 1862 (72%) were male and 724 (28%) female (28%); 2095 (81%) were current smokers, 414 (16%) ex-smokers, and 78 (3%) non-smokers.

At the time of diagnosis 109 (4%) patients were aged under 50 years, 527 (20%) aged 50–59, 1017 (39%) aged 60–69 and 933 (36%) aged 70 years and over. The median age was 66·8 years, range 23–94. The median delay between first symptom and time of diagnosis was 93 days with a range of 0–1118 days.

The cell type was identified in 2117 cases: 1016 (48%) tumours were squamous cell carcinoma, 508 (24%) small cell carcinoma, 275 (13%) adenocarcinoma, 212 (10%) large cell carcinoma, and 106 (5%) other types of carcinoma. Cell typing was based on a biopsy specimen in 1186 (56%), sputum in 487 (23%), a surgical specimen in 275 (13%), and other sources in 169 (8%). The cell type was not known in 11% of patients aged less than 60, 18% of patients aged 60–70, and 26% of patients aged over 70 ($p < 0·001$).

The women were significantly younger than the men, with 79% aged less than 70, compared with 61% of the men; 7% of the women were aged less than 60, compared with 3% of the men ($p < 0·001$). The 579 women with a known cell type had significantly more small cell carcinoma (29% *v* 21%) and adenocarcinoma (18% *v* 11%) and less squamous cell carcinoma than the men (38% *v* 52%; in each case $p < 0·001$ (fig 1)).

Among the 2117 patients with known cell type, men and women aged less than 60 years also had significantly more small cell carcinoma (28% *v* 22%) and less squamous cell carcinoma (41% *v* 51%) than patients aged more than 60 years ($p < 0·005$). The influence of age on the proportion of patients with the different cell types, and of those without a known cell type, is illustrated in figure 2. The age differences remained significant when men and women were considered separately.

The treatment initially chosen for the patients registered in 1981–83 is shown in table 1: 19% were referred for surgical treatment, 12% for chemotherapy, 38% for symptomatic treatment only, and 31% for radiotherapy; of those referred for radiotherapy, 81% received palliative and 19% radical regimens. The chosen treatment was strongly related to cell type: 27% of those with squamous cell carcinomas and large cell carcinomas and 32% of those with adenocarcinomas underwent surgical treatment (221/808, 49/180, and 68/210 respectively) compared

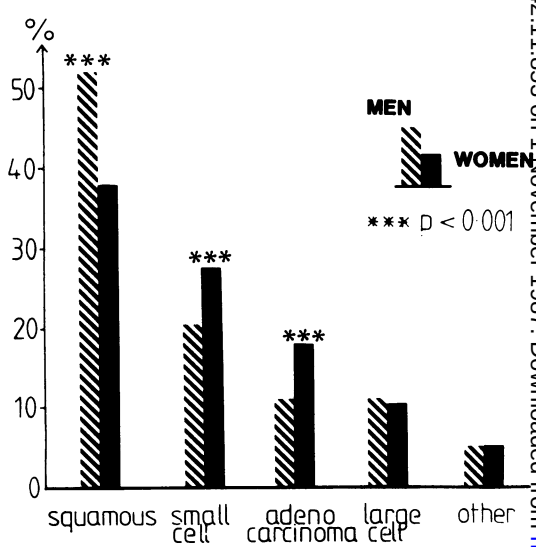

Fig 1 *Percentage of men and women with each cell type.*

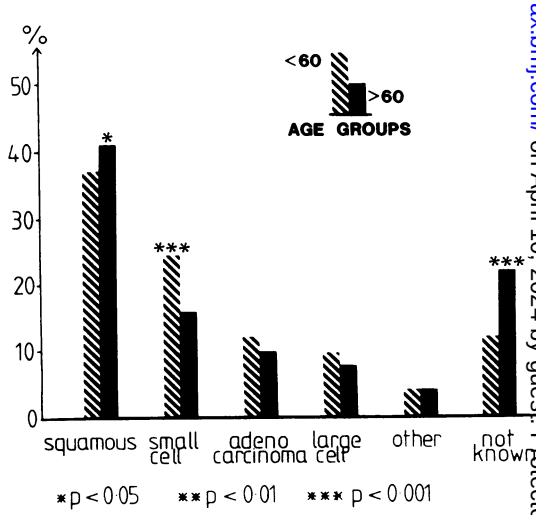

Fig 2 *Age and cell type: patients aged less than 60 compared with older patients.*

Table 1 *Treatment selected for patients, 1981–83, according to histological cell type*

Cell type	*Treatment proposed (No of patients)*				
	Radiotherapy	*Chemotherapy*	*Surgery*	*Symptomatic only*	*Total*
No pathological findings	112	0	8	256	376 (19%)
Large cell	71	12	49	48	180 (9%)
Small cell	88	177	26	81	372 (18%)
Squamous cell	287	44	221	256	808 (40%)
Adenocarcinoma	34	15	68	93	210 (10%)
Other carcinomas	31	5	12	28	76 (4%)
Total	623 (31%)	253 (12%)	384 (19%)	762 (38%)	2022

with only 7% (26/372) of those with small cell carcinomas (table 1).

Of the 651 new patients registered in 1981, 210 (32%) had evidence of metastases at the time of diagnosis, the most common sites being lymph nodes and liver (table 2). Five year survival was analysed for these patients; 12% (75/651) of the patients were alive two years after diagnosis, but only 7% (47) at five years. The highest five year survival rate was 30% (35/116) in the patients who were treated surgically (table 3). Eight of the 116 patients were found to have inoperable cancer at the time of surgery and therefore underwent thoractomy only; their median survival was 112 days. Five year survival after surgery was strongly associated with the cell type: 55% (11/20) of patients with adenocarcinoma, 31% (20/65) of those with squamous cell carcinoma, and 12% (2/16) of those with large cell carcinoma compared with 14% (1/7) of patients with small cell carcinoma ($p < 0.01$).

The 116 patients treated surgically were a highly selected group and were significantly younger than the remaining 535 patients not treated surgically (median age 63·5 *v* 67·6 years; $p < 0.01$), with less advanced disease in terms of stage and TNM grading and with a predominance of more favourable histological cell types (table 4). The patients who were treated surgically also had a better performance status, with 102 (89%) achieving 80% or more on the Karnofsky index compared with only 240 (48%) of the remaining 500 patients whose performance status was known ($p < 0.001$), (table 4). The delay in diag-

Table 2 *Site of metastases in 210 patients with lung cancer registered in 1981*

	No (%)
Lymph nodes (cervical 49; axillary, mediastinal, inguinal, other 31)	79 (32)
Liver	58 (23)
Bone (marrow 29, spine 15, other 5)	49 (20)
Brain	30 (12)
Other lung	15 (6)
Skin, chest, or abdominal wall	11 (4)
Adrenal, kidney, pericardium, larynx, peritoneum, or ovary	7 (3)
Total	249*

*Metastases were detectable at one site in 156 cases (74%), two sites in 36 (17%), and three or more sites in 18 (9%).

Table 3 *Five year survival in the 651 patients registered in 1981 according to treatment given*

	Total	*Alive at 5 years*	*(% surviving)*
Surgical treatment	116	35	(30)
Non-surgical treatments	535	12*	(2)
Palliative radiotherapy	193	3	(1·5)
Radical radiotherapy (alone)	42	7*	(17)
Chemotherapy	98	4*	(4)
Symptomatic treatment only	203	0	—
All patients	651	47	(7)

*Two patients with small cell carcinoma received both chemotherapy and radical radiotherapy.

Table 4 *Patients registered in 1981: 116 treated surgically compared with the remaining 535 patients*

	Surgery n (%)	*No surgery n (%)*
(a) Histology		
Squamous cell	66 (57)	206 (50)
Small cell	7** (6)	103** (25)
Adenocarcinoma	20** (17)	32** (8)
Large cell	16 (14)	48 (12)
Other carcinoma	7 (6)	24 (5)
Not known	—	122
Total	116 (100)	535 (100)
(b) ATS (TNM) stage		
I	85** (73)	139** (26)
II	15 (13)	32 (6)
III	16 (14)	364 (68)
Total	116 (100)	535 (100)
(c) Karnofsky performance		
10–60%	1 (1)	156 (30)
70%	8 (10)	111 (22)
80%	11 (14)	113 (22)
90%	46 (59)	111 (22)
100%	13 (16)	21 (4)
Not known	37	23
Total	116 (100)	535 (100)

**$p < 0.001$.

nosis (date of first symptom to the date of the diagnosis) was, however, slightly longer in the patients treated surgically (median delay 105·4 days *v* 90·6 days; $p < 0{\cdot}01$).

Survival in the 535 patients who were not suitable for surgical treatment was poor, only 2% surviving for five years. Survival in the different subgroups is shown in table 3.

Discussion

This series represents a large unselected group of patients with lung cancer arising from a catchment population of almost one million.[2 5] It illustrates current clinical practice by respiratory physicians and their specialist colleagues and has particular relevance as Scotland suffers the highest incidence of lung cancer in the world.[2 3] Members of the Edinburgh Lung Cancer Group see more than 80% of all new cases of lung cancer arising within their catchment population.[5] Possibly the remaining 15–20% of cases who are seen by general physicians or geriatricians or simply by their general practitioners are as a group somewhat older and perhaps more frail.

The increasing proportion of women with lung cancer (28% in this series) is particularly alarming, having doubled in the last 25 years; the absolute rate has more than trebled (from 13 to 48 per 100 000)[2] and is likely to go on rising for at least the next 10 years.[11] Deaths from lung cancer now exceed deaths from breast cancer in Scottish women.[12]

Only 3% of lung cancers in this series occurred in lifelong non-smokers. The incidence of lung cancer is closely related to trends in cigarette consumption, with a lag of 20–30 years.[13] The prevalence of smoking is slowly falling in the United Kingdom and death rates from lung cancer are beginning to fall in younger age groups.[11] This may also reflect trends in cigarette tar yields, the increasing use of filter tips and, possibly, reduced levels of air pollution.[14 15]

In this series small cell carcinoma and adenocarcinoma were relatively more common and squamous cell carcinoma less common in women and in younger patients, as others have recently reported.[16] This might reflect the presentation of more rapidly growing tumours at an earlier age,[13 17] and it certainly confirms Auerbach's observations that squamous cell carcinoma became relatively more common with increasing age and that most adenocarcinomas occurred in smokers.[18]

Cell typing in lung cancer remains a problem. In this series 5% of lung cancers did not "fit" under one of the four major histological headings, and the proportion is sometimes as large as 12%.[8] The use of the four major headings without further qualification is probably inadequate and may be misleading.[8] There may be further problems when cell typing is based on sputum cytology alone,[8 19 20] as in almost a quarter of this series.

Survival in lung cancer is poor for all treatments other than surgical resection, and at the time of diagnosis 80% of patients in this and other series were considered unsuitable for surgical resection.[21 22] Even after surgical resection, only 25–30% survive for five years, a proportion that has not changed significantly in the last 30 years.[23] The major prognostic factors determining outcome in lung cancer are now well recognised and include the stage of the disease, age, absence of systemic symptoms, and the patient's performance status.[21 22 24] Prognosis is also associated with the cell type but, although squamous cell carcinoma is conventionally considered the most favourable cell type,[22 24] two recent European studies also found, like us, that adenocarcinoma had the best prognosis.[25 26]

Small cell lung cancer is now recognised as a discrete entity.[22 27] Surgery may offer cure in the very rare patient with true stage I disease.[21 28] For the remainder a combination of chemotherapy and radiotherapy may achieve a three year survival of 15% in selected patients with "limited disease" (tumour confined to one hemithorax, including the ipsilateral supraclavicular fossa).[28 29] Five year survival in the patients with small cell carcinoma in this unselected series was only 5%, however.

Lung cancer is thus the actual cause of death in over 90% of patients in this and other series.[16] Most patients with advanced lung cancer have distressing symptoms[30] and the palliation of these symptoms presents a major work load for both the general practitioners and the hospital doctors concerned.

This study confirms that the current outlook for patients with lung cancer remains very poor. The value of large scale scale screening programmes remains uncertain[31] and therefore the major emphasis should be on prevention.

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References

1 Office of Population Censuses and Surveys. *Mortality Statistics 1982*. London: HMSO, 1984.
2 Registrar General Scotland. *Annual report 1984*. Edinburgh: HMSO, 1985.
3 World Health Organisation. In: *Vital statistics and causes of death world health statistics annual 1982*. Geneva: WHO, 1982.
4 Sudlow MF. Lung cancer in South East Scotland. *Eur J Respir Dis* 1982;**63**(suppl 125):20.
5 Capewell S. Lung cancer in South East Scotland 1981–1984: Edinburgh Lung Cancer Group [abstract]. *Thorax* 1985;**40**:209–10.
6 Karnofsky DA, Abelmann WH, Craver LF, Burchenal JH. The use of nitrogen mustards in the palliative treatment of cancer. *Cancer* 1948;**1**:634–56.
7 American Thoracic Society. Clinical staging of primary lung cancer. ATS official statement. *Am Rev Respir Dis* 1983;**127**:659–64.
8 Lamb D. Histological classification of lung cancer. *Thorax* 1984 [editorial];**39**:161–5.
9 Scottish Cancer Registration Scheme. *Cancer registration statistics, Scotland, 1971–1980*. 2nd ed. Edinburgh: Scottish Health Services Common Services Agency, 1984.
10 Nie NH. *Statistical package for social sciences X*. New York: McGraw Hill, 1983.
11 Coggon D, Acheson ED. Trends in lung cancer mortality. *Thorax* 1983;**38**:721–3.
12 Scottish Home and Health Department. *Health in Scotland, 1984*. Edinburgh: HMSO, 1985.
13 Geddes DM. The natural history of lung cancer: a review based on rates of tumour growth. *Br J Dis Chest* 1979;**73**:1–17.
14 Doll R, Peto R. The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *J Natl Cancer Inst* 1981;**66**:1192–308.
15 Wald N, Doll R, Copeland G. Trends in tar, nicotine and carbon monoxide yields of UK cigarettes manufactured since 1934. *Br Med J* 1981;**282**:763–5.
16 Mould RF, Williams RJ. Survival of histologically proven carcinoma of the lung registered in the North West Thames region 1975–1979. *Br J Cancer* 1982;**46**:999–1003.
17 Steele JD, Buell P. Asymptomatic solitary pulmonary nodules. *J Thorac Cardiovasc Surg* 1973;**65**:140–6.
18 Auerbach O, Garfinkel L, Parks VR. Histologic types of carcinoma in relation to smoking habit, year of diagnosis and sites of metastases. *Chest* 1975;**67**:382–7.
19 Payne CR, Hadfield JW, Stovin PG, Barker V, Heard BE, Stark JE. Diagnostic accuracy of cytology and biopsy in primary bronchial carcinoma. *J Clin Pathol* 1981;**34**:773–8.
20 Chuang MT, Marchevisky A, Teirstein AS, Kirschner PA, Kleinerman J. Diagnosis of lung cancer by fibreoptic bronchoscopy: problems in the histological classification in non-small cell carcinomas. *Thorax* 1984;**39**:175–8.
21 Spiro SG, Goldstraw P. The staging of lung cancer. *Thorax* 1984;**39**:401–7.
22 Sudlow MF. The treatment of lung cancer. In: Flenley DC, ed. *Recent advances in respiratory medicine II*. 2nd ed. Edinburgh: Churchill Livingstone, 1980:125–40.
23 Belcher JR. Thirty years of surgery for carcinoma of the bronchus. *Thorax* 1983;**38**:428–32.
24 Clee MD, Hockings NF, Johnston RD. Bronchial carcinoma: factors influencing post-operative survival. *Br J Dis Chest* 1984;**78**:225–35.
25 Freise G, Gabler A, Liebig S. Bronchial carcinoma and long term survival. Retrospective study of 433 patients who underwent resection. *Thorax* 1978;**33**:228–34.
26 Cv Tuyll V, Serooskerke-Apap, Wever AMJ, Hermans J. Epidemiological study of lung cancer cases treated at the University Hospital Leiden 1969–81. *Eur J Respir Dis* 1982;suppl 125:11.
27 Hansen HH. Management of small cell anaplastic carcinoma. In: *Lung cancer 1980 postgraduate course, 2nd World Congress on Lung Cancer, Copenhagen*. Amsterdam: Excerpta Medica, 1980.
28 Wilde J. Prognostic factors of patients with resected small cell carcinoma. *Eur J Respir Dis* 1982;suppl 125:39.
29 Aisner J, Alberto P, Bitran J, *et al*. Role of chemotherapy in small cell lung cancer: a consensus report of the International association for the study of lung cancer workshop. *Cancer Treat Rep* 1983;**67**:37–43.
30 Twycross RG. The terminal care of patients with lung cancer. *Postgrad Med J* 1973;**49**:732–7.
31 Weiss W. Screening for lung cancer. *Chest* 1985;**87**:273.